PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-067037
(43)Date of publication of application : 11.03.1997

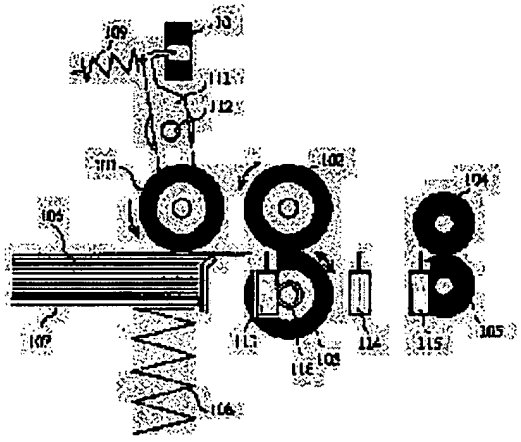
(51)Int.Cl. B65H 3/52
B65H 7/12

(21)Application number : 07-224868
(22)Date of filing : 01.09.1995

(71)Applicant : MINOLTA CO LTD
(72)Inventor : HORI HARUHIKO

(54) CUT SHEET FEEDING DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a cut sheet feeding device that can prolong the service life of a feed roller and reduce stress applied to cut sheets.
SOLUTION: A cut sheet feeding device having overlap feed preventing mechanism 102, 103 has a means 110 for detecting a friction coefficient between sheets, a means 113 for detecting the frequency of overlap feed of cut sheets, means 114, 115 for detecting cut sheet conveying speed in a feeding process, and a control part. On the basis of the combination of the detected result of the respective detecting means, the control part performs the change control of the grade of sheet separating force of the overlap feed preventing mechanism.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The delivery means which lets out a cut sheet, and the normal rotation roller which contacts the top face of the cut sheet which it let out, and carries out a conveyance operation in the delivery direction to a cut sheet, It has the separation roller which countered with the normal rotation roller and was formed, and the torque limiter which transmits a drive to a separation roller. In the cut sheet feeding equipment which follows to rotation of the conveyance direction of a normal rotation roller, and is made to rotate a separation roller when a torque limiter exceeds a threshold, while rotating a separation roller to rotation of the conveyance direction of a normal rotation roller, and hard flow until a torque limiter exceeds a threshold A coefficient-of-friction detection means to detect coefficient of friction between sheets in the cut sheet loaded in said equipment, A companion delivery detection means to detect whether there are other cut sheets taken and sent to the cut sheet which it let out with said delivery means, Cut sheet feeding equipment characterized by having a bearer rate detection means to detect the bearer rate of the cut sheet conveyed from said normal rotation roller, and the control means which controls the threshold of said torque limiter based on the detection result by said three detection means.
[Claim 2] Said cut sheet feeding equipment is further equipped with the driving torque change means which changes the threshold of said torque limiter. Said control means When coefficient of friction between said sheets judges that it is larger than predetermined criteria coefficient of friction When said driving torque change means is operated so that only the specified quantity may enlarge the threshold of said torque limiter, and the frequency of said companion delivery judges that it is larger than predetermined frequency When said driving torque change means is operated so that only the specified quantity may enlarge the threshold of said torque limiter, and said bearer rate judges that it is smaller than a predetermined criteria rate Cut sheet feeding equipment according to claim 1 characterized by operating said driving torque change means so that only the specified quantity may make the threshold of said torque limiter small.
[Claim 3] The feed roller which said delivery means contacts the maximum top face of the cut sheet loaded in equipment, lets it out to a cut sheet, and acts the force, It consists of a rocking lever which supports the feed roller to revolve, and a spring which energizes said rocking lever in the direction which negates the reaction force which said feed roller receives from a cut sheet at the time of a delivery. It consists of a photograph switch which detects whether said rocking lever resisted the energization force of said spring, and rocked said coefficient-of-friction detection means more than the specified quantity. Said companion delivery detection means It consists of the 1st reflective mold photosensor which detects whether a cut sheet exists in predetermined time of day in the upstream of said normal rotation roller. Said bearer rate detection means Two the 2nd and 3rd reflective mold photosensor with which only predetermined spacing was left and prepared in the cut sheet conveyance direction in the downstream of said normal rotation roller, The tip of the cut sheet conveyed from said normal rotation roller consists of a timer which measures the time amount taken to pass two points in which these sensors were formed with the signal from these sensors. Said control means is cut sheet feeding equipment according to claim 2 characterized by accumulating the information from said photograph switch, said 1st reflective mold photosensor, and said timer by the cut sheet of predetermined number of sheets, and operating said driving torque change means based on the accumulated information.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to cut sheet feeding equipment equipped with the control unit for preventing a double feed especially about the cut sheet feeding equipment used for a copying machine, a printer, etc.
[0002]
[Description of the Prior Art] In airline printers, such as a copying machine and a printer, a high speed and the feed equipment with which paper is certainly fed at a time to one cut sheet are needed. That is, even if paper is fed to a high speed, the thing paper is fed to, with the cut sheet of two or more sheets lapped (this phenomenon is hereafter called "double feed".) must avoid. as one method which prevents the double feed of such a cut sheet -- a separation roller with a torque limiter -- mackerel -- there are some which are called ******. Hereafter, the Prior art which can set this method is explained.
[0003] drawing 13 -- the conventional separation roller with a torque limiter -- mackerel -- it is the side elevation of the feed equipment by ******. One sheet thru/or after letting out several sheets, it separates into one sheet at a time, and the cut sheet 106 which pushed up and was energized with the spring 108 and which pushed up and was loaded on the plate 107 is sold by the pickup roller 101, and is fed to the exterior of this equipment by the normal rotation roller 102 and the separation roller 103 with the conveyance rollers 104 and 105 with it.
[0004] By the way, the following conditions need to be satisfied, in order to sell a cut sheet and to dissociate certainly [the one most significant].
mu 1 > TS/(NSxR) >= mu 2 > mu 0 -- here Coefficient of friction between sheets and mu 1 mu 0 Coefficient of friction of a 102 pairs of normal rotation roller cut sheet (it is 2 at the maximum), mu 2 is the torque value (it is hereafter called "limit torque value".) used as the threshold which, as for coefficient of friction of a 103 pairs of separation roller cut sheet, and NS, the separation roller 103 rotates to the contact pressure of the normal rotation roller 102 and the separation roller 103, and TS begins to rotate in the direction of a counterclockwise rotation. R is the radius of the separation roller 103.
[0005] By the way, the coefficient of friction mu 0 between sheets takes the value which changes with classes of cut sheet etc. For example, generally the cut sheet used for a copying machine has the range of broad coefficient of friction especially compared with the cut sheet used for other applications. Therefore, it faces determining limit torque value TS which fulfills the above-mentioned conditions certainly, and it is necessary to choose limit torque value TS supposing the coefficient of friction [to some extent] mu 0 between sheets higher than the average coefficient of friction mu 0 (0.4-0.7) between sheets.
[0006] therefore, the thing for which limit torque value TS which can respond to dispersion in a certain amount of coefficient of friction mu 0 between sheets, i.e., larger limit torque value TS, is set up conventionally -- the big sheet to feed equipment -- mackerel -- **** was generated and the double feed of a cut sheet was prevented.
[0007]
[Problem(s) to be Solved by the Invention] however, enlarging limit torque value TS, i.e., a sheet, -- mackerel -- enlarging **** will increase superfluously the follower resistance in the moment the separation roller 103 is not selling the cut sheet, and excessive stress will be given to rollers 102 and 103 and a cut sheet. Although it falls inevitably by wear of a roller, as for coefficient of friction mu1 and mu2, the excessive stress to such a roller brings forward the fall of coefficient of friction mu1 and mu2. Therefore, a result to which the upper limit of the coefficient of friction mu 0 mu 0 between sheets with which are satisfied of the above-mentioned conditional expression, i.e., coefficient of friction between sheets to which the double feed of the cut sheet is not carried out, is restricted was brought, and it had become the cause which causes the fall of feed dependability.

[0008] In order to call off the unnecessary stress to such a roller, the method of determining feed conditions, such as limit torque value TS, based on the form information (thickness, air permeability, etc. of a cut sheet) which the operator inputted beforehand is proposed (for example, JP,1-117139,A). However, there are it being unable to respond to the big coefficient of friction mu 0 between sheets generated rarely, even if it can respond to the input by the operator whenever it uses the cut sheet of a new class by such approach being needed, and the average cut sheet which has the inputted form information, and a trouble that it cannot respond to the fall of the coefficient of friction mu1 and mu2 by wear of rollers 102 and 103 etc. further, either.
[0009] Then, it sets it as the 1st purpose to offer the cut sheet feeding equipment with which a cut sheet is certainly sold and paper is fed to it, without [without this invention is made in view of this trouble and it is accompanied by the input by the operator, and] being dependent on the class of cut sheet. Moreover, the 2nd purpose of this invention is offering the reliable cut sheet feeding equipment with which feed conditions' are automatically changed corresponding to those situations, and the double feed of the cut sheet is not carried out, even if wear of a roller and dispersion of the coefficient of friction mu 0 between sheets occur.
[0010] furthermore, the 3rd purpose of this invention -- a feed process -- setting -- unnecessary -- a big sheet -- mackerel -- it is offering the cut sheet feeding equipment which can aim at the prolongation of life of a feed roller, and mitigation of the stress given to a cut sheet by avoiding that **** occurs.
[0011]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, cut sheet feeding equipment according to claim 1 The delivery means which lets out a cut sheet, and the normal rotation roller which contacts the top face of the cut sheet which it let out, and carries out a conveyance operation in the delivery direction to a cut sheet, It has the separation roller which countered with the normal rotation roller and was formed, and the torque limiter which transmits a drive to a separation roller. In the cut sheet feeding equipment which follows to rotation of the conveyance direction of a normal rotation roller, and is made to rotate a separation roller when a torque limiter exceeds a threshold, while rotating a separation roller to rotation of the conveyance direction of a normal rotation roller, and hard flow until a torque limiter exceeds a threshold A coefficient-of-friction detection means to detect coefficient of friction between sheets in the cut sheet loaded in said equipment, A companion delivery detection means to detect whether there are other cut sheets taken and sent to the cut sheet which it let out with said delivery means, It is characterized by having a bearer rate detection means to detect the bearer rate of the cut sheet conveyed from said normal rotation roller, and the control means which controls the threshold of said torque limiter based on the detection result by said three detection means.
[0012] Cut sheet feeding equipment according to claim 2 is set to cut sheet feeding equipment according to claim 1. It has the driving torque change means which changes the threshold of said torque limiter. Furthermore, said control means When coefficient of friction between said sheets judges that it is larger than predetermined criteria coefficient of friction When said driving torque change means is operated so that only the specified quantity may enlarge the threshold of said torque limiter, and the frequency of said companion delivery judges that it is larger than predetermined frequency When said driving torque change means is operated so that only the specified quantity may enlarge the threshold of said torque limiter, and said bearer rate judges that it is smaller than a predetermined criteria rate It is characterized by operating said driving torque change means so that only the specified quantity may make the threshold of said torque limiter small.
[0013] Cut sheet feeding equipment according to claim 3 is set to cut sheet feeding equipment according to claim 2. Said delivery means The feed roller which contacts the maximum top face of the cut sheet loaded in equipment, lets out to a cut sheet, and acts the force, It consists of a rocking lever which supports the feed roller to revolve, and a spring which energizes said rocking lever in the direction which negates the reaction force which said feed roller receives from a cut sheet at the time of a delivery. It consists of a photograph switch which detects whether said rocking lever resisted the energization force of said spring, and rocked said coefficient-of-friction detection means more than the specified quantity. Said companion delivery detection means It consists of the 1st reflective mold photosensor which detects whether a cut sheet exists in predetermined time of day in the upstream of said normal rotation roller. Said bearer rate detection means Two the 2nd and 3rd reflective mold photosensor with which only predetermined spacing was left and prepared in the cut sheet conveyance direction in the downstream of said normal rotation roller, The tip of the cut sheet conveyed from said normal rotation roller consists of a timer which measures the time amount taken to pass two points in which these sensors were formed with the signal from these sensors. Said control means is characterized by accumulating the information from said photograph switch, said 1st reflective mold photosensor, and said timer by the cut sheet of predetermined number of sheets, and operating said driving torque change means based on the accumulated information.

[0014]
[Embodiment of the Invention] Hereafter, one gestalt of operation of this invention is explained to a detail using a drawing. Drawing 1 is the block diagram showing the configuration of the cut sheet feeding equipment concerning this operation gestalt. This equipment is roughly divided and consists of the feed device section 100 and a control section 200 which controls it. A control section 200 reads the sensor signal from the feed device section 100, and sends a clutch driving signal to the feed device section 100 based on the result. Hereafter, sequential explanation of these internal configurations and actuation is given.
(Configuration of the feed device section 100) the separation roller with a torque limiter which drawing 2 requires for this equipment -- mackerel -- it is the side elevation of the feed device section 100 by ******. It has composition which added a lever 111, a pivot 112, a spring 109, the photograph switch 110, and the reflective mold photosensors 113-115 to the conventional feed equipment shown in drawing 13 at this feed device section 100. In addition, the sign of the same number is given to the same configuration section as the conventional feed section, and the explanation is omitted. Moreover, a pivot 112, the end of a spring 109, the photograph switch 110, the reflective mold photosensor 113 - 115 grades are being fixed to the frame of this equipment which is not illustrated.
[0015] A pickup roller 101 is supported to revolve by the pivot 112 through a lever 111, and is usually energized by the location (downstream of the loaded cut sheet) shown in drawing 2 with the spring 109. Moreover, the photograph switch 110 is formed near the upper part of a lever 111, and a motion to the horizontal direction of a lever 111 up height is detected. Here, the "downstream" means the direction (it goes to drawing 2 and is a method of the right) where the cut sheet is conveyed, and, on the other hand, calls an opposite direction the "upstream" with it.
[0016] The reflective mold photosensor 113 which detects the existence of the cut sheet which it let out from the pickup roller 101 is formed in the upstream of the separation roller 103. The reflective mold photosensors 114 and 115 which similarly detect the existence of the cut sheet in two points located in a line also with the upstream of the conveyance rollers 104 and 105 in the conveyance direction are formed. In addition, the signal from the above-mentioned photograph switch 110 and the reflective mold photosensors 113-114 is sent to a control section 200 as a sensor signal.
[0017] The torque limiter 116 has determined the torque value to which the separation roller 103 begins to turn in the direction of a counterclockwise rotation, i.e., limit torque value TS to which it acts on the separation roller 103, and constitutes the torque limiter change means shown in the perspective view of drawing 3 , and the mimetic diagram of drawing 4 . If the torque limiter 116 is used, when the separation roller 103 is followed and rotated normally in the sheet conveyance force with the normal rotation roller 102 when placed between the nip sections of the normal rotation roller 102 and the separation roller 103 by one sheet and two or more sheets intervene, the separation roller 103 acts so that it may reverse and the sheet after the 2nd sheet may be returned to the upstream.
[0018] Drive direct connection of the torque limiter 330 is carried out without the torque limiter 310 and the torque limiter 320 interlocking, respectively, connecting them to the electromagnetic clutches 314 and 324 of normal close by specifically consisting of three more kinds of different torque limiters 310, 320, and 330, and on the other hand the torque limiter 116 minding an electromagnetic clutch so that drawing 3 and drawing 4 may show. Each torque limiters 310, 320, and 330 are mutually connected by gears 312, 313, 322, 323, 332, and 333 in the upstream of a drive, and the downstream, respectively. Electromagnetic clutches 314 and 324 are intermittent with the clutch driving signal from a control section 200 (ON/OFF), and serve as limit torque value TS to which the sum of the torque acquired as a result acts on the separation roller 103. Limit torque value TS determined with the combination and combination of the intermittence in electromagnetic clutches 314 and 324 is as the electromagnetic-clutch control table shown in drawing 5 . Magnitude of each limit torque value TS is made into 1.3 times of four steps, i.e., 0.6 times of a certified value, a certified value, and a certified value, and 1.7 times of a certified value. In addition, when contact pressure NS is 400g, 300xR (g-cm) extent is suitable for a certified value.
(Actuation of the feed device section 100) Next, actuation of each sensor in the feed device section 100 constituted as mentioned above is explained. In the feed device section 100, dispersion (Sb) of the size (Sa) of the coefficient of friction mu 0 between sheets and the coefficient of friction mu 0 between sheets and three items of information on the sheet feed force (Sc) are detected for every one cut sheet which it let out from the pickup roller 101. These three items of detection principle of Sa, Sb, and Sc is explained.
[Size [of the coefficient of friction mu 0 between sheets] (Sa)] Sa is performed by detecting the dynamic reaction force at the time of the cut sheet delivery of a pickup roller 101. That is, a pickup roller 101 is in the location shown in drawing 2 , when letting out a cut sheet with the comparatively small coefficient of friction mu 0 between sheets, but when letting out a cut sheet with the comparatively large coefficient of friction mu 0 between sheets, it overcomes the energization force of a spring 109, rotates to the upstream of the loading sheet 106, and turns on the photograph switch 110. The condition of this latter is as the side elevation shown in drawing 6 . Cutoff of the drive for letting out a cut

sheet after that returns the pickup roller 101 which rotated to the location (location shown in drawing 2) of a basis automatically by the energization force of a spring 109, and follower resistance of the cut sheet which it lets out. Therefore, Sa will be detected as binary by detecting the condition (ON/OFF) of the photograph switch 110.
[0019] In addition, although the property of a spring 109, the location of the photograph switch 110, etc. can determine the threshold of the coefficient of friction mu 0 between sheets which reverses the condition of the photograph switch 110, it is set to 0.7 here.
[Dispersion [in the coefficient of friction mu 0 between sheets] (Sb)] Sb is performed by the top paper's selling and carrying out binary detection of the existence of the residual paper in activity order with the reflective mold photosensor 113 approached and installed in the upstream of the separation roller 103. That is, since counting of the cut sheet companion delivery frequency by the pickup roller 101 is carried out by carrying out counting of the case where residual paper is detected, this frequency is set to Sb.
The [the sheet feed force (Sc)] Sc is the separation roller 103 downstream, and in the conveyance roller 104 and the 105 upstream, measures one pair of reflective mold photosensors 114 by which predetermined spacing detached building ****** was carried out, and the time amount to which the top paper tip passes through between 115 in the conveyance direction of a cut sheet, and is performed by comparing the pass time (conventional time) used as the criteria beforehand determined as this pass time. With this equipment, binary distinction of the case where pass time exceeds 1.3 times of the conventional time is carried out, the case where it exceeds is depended and sold to the fall of the sheet feed force of this equipment, it is regarded as generating of a feed slip of the top paper in a process, and this frequency is set to Sc. This feed slip is generated when the fall of coefficient of friction mu1 and mu2 and the coefficient of friction mu 0 between sheets are large, and it is closely related to the balance of these mu1, mu2, and mu0.
(Configuration of a control section 200) Drawing 7 is the block diagram showing the configuration of the control section 200 of this equipment. A control section 200 consists of a detector 201, a timer 202, CPU203, memory 204, and a driver circuit 205.
[0020] A detector 201 changes and outputs the sensor signal from the reflective mold photosensor 113 formed in the feed device section 100 to reception and binary. Binary [this] corresponds to the existence of the cut sheet in the location in which this sensor 113 is formed. A timer 202 measures elapsed time until it arrives at the location in which the reflective mold photosensor 115 is formed, after the tip of reception and a cut sheet passes through the location where the signal from the reflective mold photosensors 114 and 115 formed in the feed device section 100 is formed in the reflective mold photosensor 114, and it outputs the time amount.
[0021] CPU203 operates according to the control program stored in memory 204, reads and carries out data processing of the photograph switch 110 and detector 201 which were established in the feed device section 100, and the data from a timer 202, and takes out directions to a driver circuit 205 based on the result. Memory 204 consists of RAM as a temporary storage area for ROM which memorizes a control program, and the above-mentioned data processing.
[0022] A driver circuit 205 makes intermittent the electromagnetic clutches 314 and 324 prepared in the torque limiter 116 according to the directions from CPU203.
(Actuation of a control section 200) Next, actuation of the control section 200 constituted as mentioned above is explained. Drawing 8 is a flow chart which shows actuation of a control section 200, and the processing which a control section 200 repeats for one sheet of every feeding is shown.
[0023] A control section 200 detects Sa, Sb, Sc, and the present feeding number of sheets n by reading directly first the signal from each sensors 110, 113-115 formed in the feed device section 100 through a detector 201 and a timer 202 (step S801). In addition, the present feeding number of sheets n means the number of sheets of the cut sheet to which paper was fed by then from the time of a cut sheet 106 pushing up and being set to a plate 107 by wearing of a form cassette (LCC) etc., and counting is integrated and carried out until the new cut sheet 106 pushes up and it is set to a plate 107 by desorption, such as a form cassette (LCC).
[0024] Next, limit torque value TS which becomes settled uniquely from the combination of the value of them (Sa, Sb, Sc, n) is determined (step S802). Finally, according to the electromagnetic-clutch control table shown in drawing 5 , ON/OFF of the electromagnetic clutches 314 and 324 is carried out through a driver circuit 205 so that limit torque value TS actually determined at step S802 may act on the separation roller 103 (step S803).
[0025] As mentioned above, whenever a control section 200 feeds paper to one cut sheet, it reads the signal from each sensors 110, 113-115 in the feed device section 100, and it repeats control of changing limit torque value TS if needed each time (step S 801-803). Drawing 9 is the subflow which explained the procedure of step S802 in drawing 8 to the detail.
[0026] First, it judges in which range the value of the present feeding number of sheets n is (step S901). Consequently, when the present feeding number of sheets n is less than [initial feeding number-of-sheets n0] (n<=n0) which was

defined beforehand, limit torque value TS is set as a certified value (1.0) (step S902). This is for making paper feed to limit torque value TS about the cut sheet of n0 sheet up to [from the 1st sheet] after setting a form cassette (LCC) etc., while it has been fixed.

[0027] On the other hand, when the present feeding number of sheets n is below the criteria information-unit number of sheets N (n0<n<=N) defined greatly and beforehand from the initial feeding number of sheets n0, the present feeding number of sheets n is made into the information-unit number of sheets Nf (step S903), and the present feeding number of sheets n makes the criteria information-unit number of sheets N the information-unit number of sheets Nf, in being larger than the criteria information-unit number of sheets N (N<n) (step S904). Thus, the information-unit number of sheets Nf is set up in the following step for computing the accumulation information Na, Nb, and Nc about Sa, Sb, and Sc in the cut sheet of the newest predetermined number of sheets Nf to which paper was already fed (step S905). The accumulation information Na, Nb, and Nc is set to feeding of a newest Nf sheet cut sheet here, respectively. The number of sheets of the cut sheet to which paper was fed by the photograph switch 110 serving as ON, It corresponds to the number of sheets of the cut sheet to which was detected with "those with residual paper" and paper was fed by the reflective mold photosensor 113, and the number of sheets of the cut sheet with which paper was fed to the time amount to which a cut sheet passes the reflective mold photosensors 114 and 115 exceeding 1.3 times of the conventional time.

[0028] In this equipment, 5 and the criteria information-unit number of sheets N are set to 20 for the initial feeding number of sheets n0. Therefore, limit torque value TS serves as a certified value (1.0) to the 5th sheet after feed initiation. the 6th sheet -- the accumulation information for 1-5 sheets -- being based -- the 7th sheet -- the accumulation information for 1-6 sheets -- being based ... and the 20th sheet -- the accumulation information for 1-19 sheets -- being based -- the 21st sheet -- the accumulation information for 1 to 20 sheets -- being based -- the 22nd sheet -- the accumulation information for 2-21 sheets -- being based ... it is determined.

[0029] If Nf, Na, Nb, and Nc are computed as mentioned above, according to the controlling torque value decision table shown in drawing 10 , limit torque value TS which becomes settled uniquely from the combination of these four values will be determined (step S906). In addition, the procedure in step S906 is as the flow chart shown in drawing 11 . here -- three ratios -- Na/Nf, Nb/Nf, and Nc/Nf have determined limit torque value TS by whether it is the reference value 0.7 defined beforehand, respectively, 0.3, and 0.7 or more.

[0030] In addition, although the contents of the controlling torque value decision table shown in drawing 10 itself are determined based on an experiment of this equipment, it is fundamentally based on the following principles. namely, -- since it means that the coefficient of friction mu 0 between sheets (Sa) is large when (1) Na/Nf is large -- a big sheet -- mackerel -- in order to generate ****, limit torque value TS is enlarged.

(2) since dispersion in the coefficient of friction mu 0 between sheets (Sb) means a large thing when Nb/Nf is large -- a sheet -- mackerel -- in order to enlarge **** and to make it stand by, enlarge limit torque value TS.

(3) since it means that the sheet feed force (Sc) declined when Nc/Nf is large -- a sheet -- mackerel -- in order to decrease ****, make limit torque value TS small.

[0031] thus, the necessary minimum sheet based on [in this equipment, whenever paper is fed to the cut sheet of one sheet three items of the size of the coefficient of friction mu 0 between sheets, dispersion, and the sheet feed force (balance of mu1, mu2, and mu0) are detected, and] these -- mackerel -- ****, i.e., limit torque value TS, is determined. Actuation of the detection principle of each sensor in the cut sheet feeding equipment concerning this invention explained above, the control approach, etc. is arranged on the table shown in drawing 12 .

[0032] As mentioned above, although the cut sheet feeding equipment concerning this invention was explained based on 1 operation gestalt, as for this invention, it is needless to say that it is not restricted to this operation gestalt. That is, although (1) book equipment had one step of feed device section 100, it is not limited to this number of stages. If it is in the case of the cut sheet feeding equipment which has two or more steps of feed devices, you may be ** to which this invention is applied about the feed device of each stage.

(2) Although five rollers 101-105 which constitute the feed device section 100 were formed in the location which conveys a cut sheet in the direction of a straight line, they are not limited to such physical relationship. The feed device section 100 is equipped with the guide equipment for conveying a cut sheet rounded etc., and may be prepared in the location located in a line on a curve with these fixed rollers.

[0033]

[Effect of the Invention] According to this invention, automatic detection of the information about coefficient of friction of the cut sheet to which paper was fed actually is carried out, and control which prevents a double feed based on the information is performed so that clearly from the above explanation. Therefore, on the occasion of use of a new cut sheet, an operator does not need to input the information about the cut sheet beforehand. Moreover, without being dependent on the magnitude and dispersion of the class of cut sheet, or coefficient of friction, a cut sheet is sold

certainly and paper is fed to it.
[0034] moreover, according to this invention, whenever paper is fed to one cut sheet, the information about coefficient of friction detects -- having -- a suitable sheet -- mackerel -- it is controlled so that **** occurs. therefore, a feed process -- setting -- unnecessary -- a big sheet -- mackerel -- it is avoided that **** occurs and it can aim at the prolongation of life of a feed roller, and mitigation of the stress given to a cut sheet. Furthermore, since control not only in consideration of coefficient of friction of cut sheets but coefficient of friction of the roller and cut sheet which sell a cut sheet is performed according to this invention, generating of the double feed by wear of a roller can be avoided, and it becomes possible to offer more reliable cut sheet feeding equipment.

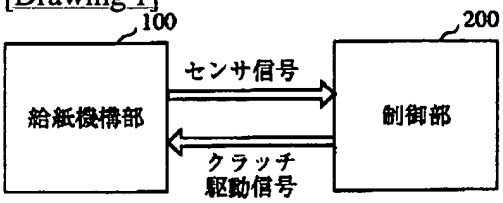
[Translation done.]

* NOTICES *

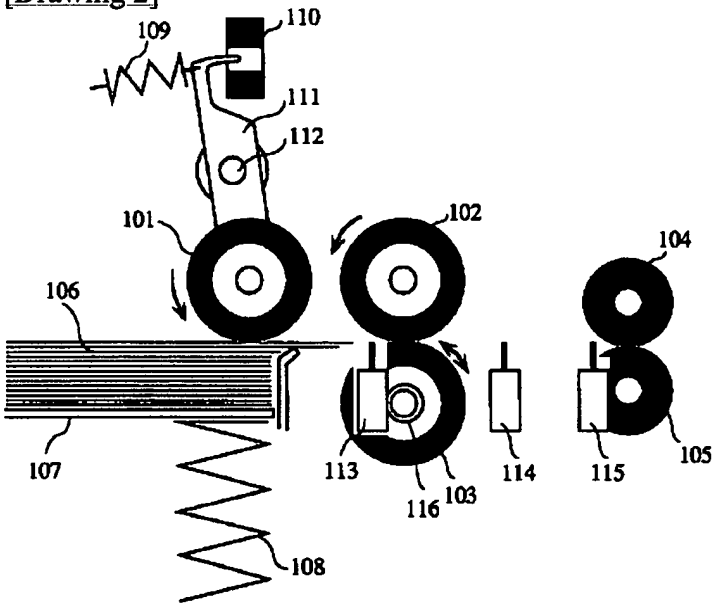
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

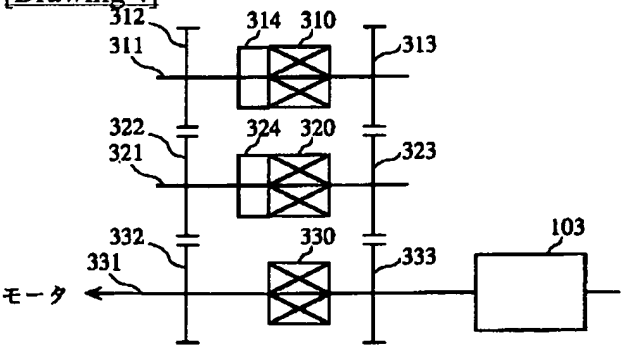
[Drawing 1]



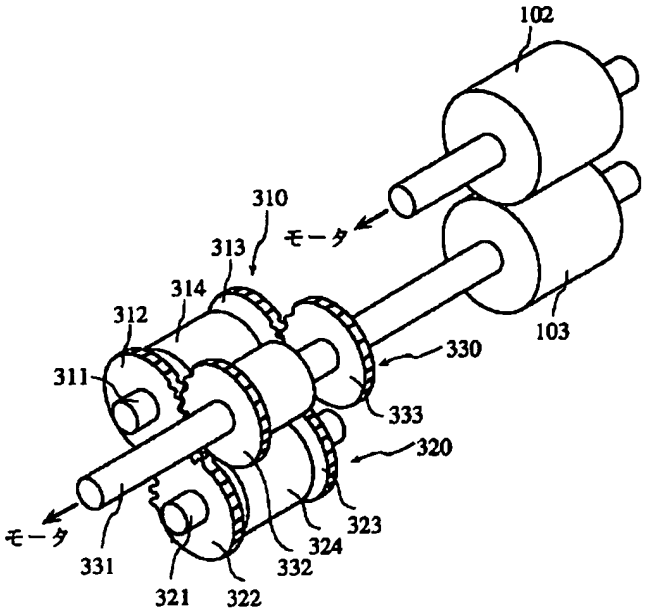
[Drawing 2]



[Drawing 4]



[Drawing 3]

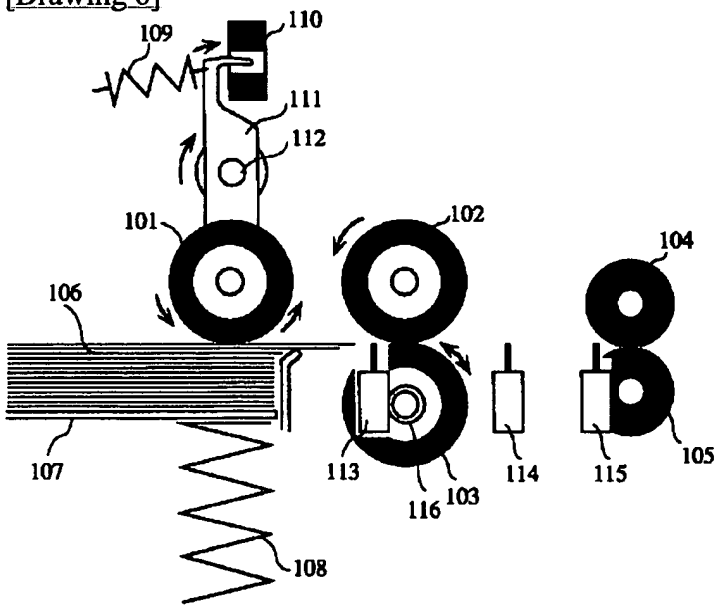


[Drawing 5]

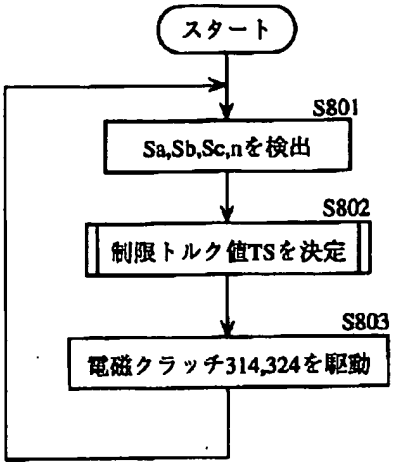
電磁クラッチ制御テーブル

電磁クラッチ	314	324	—	制限トルク値 TSの比
連動トルクリミタ	310	320	330	
トルク比	0.4	0.7	0.6	
電磁クラッチの作動	OFF	OFF	—	1.7
	ON	OFF	—	1.3
	OFF	ON	—	1.0 (標準値)
	ON	ON	—	0.6

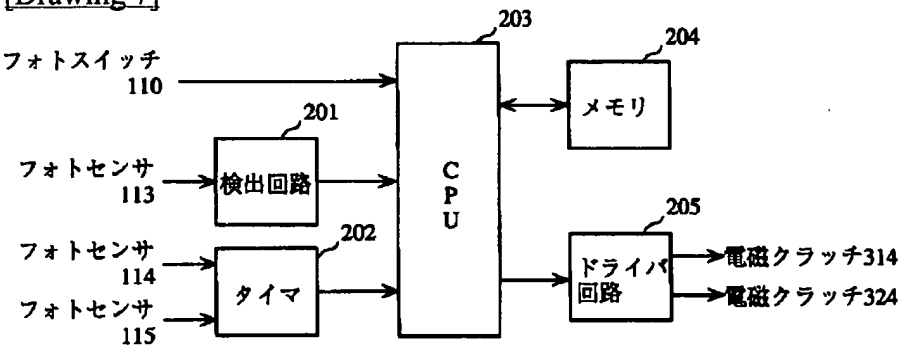
[Drawing 6]



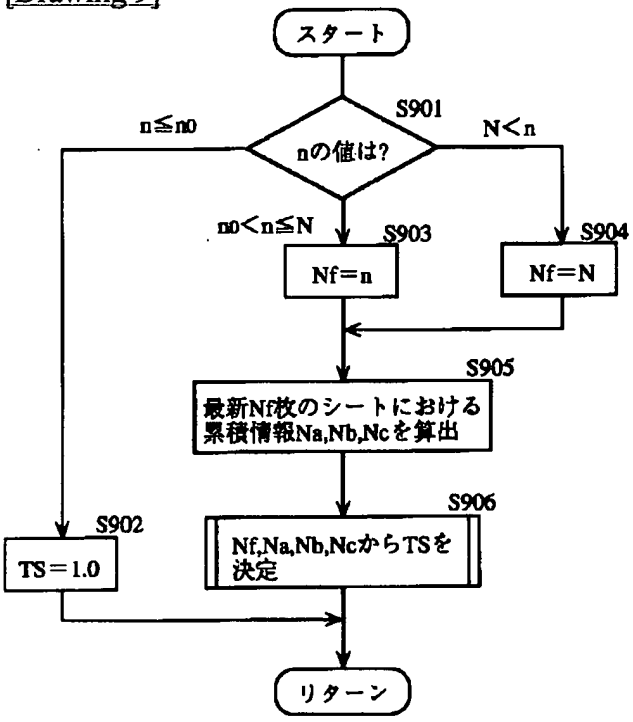
[Drawing 8]



[Drawing 7]



[Drawing 9]

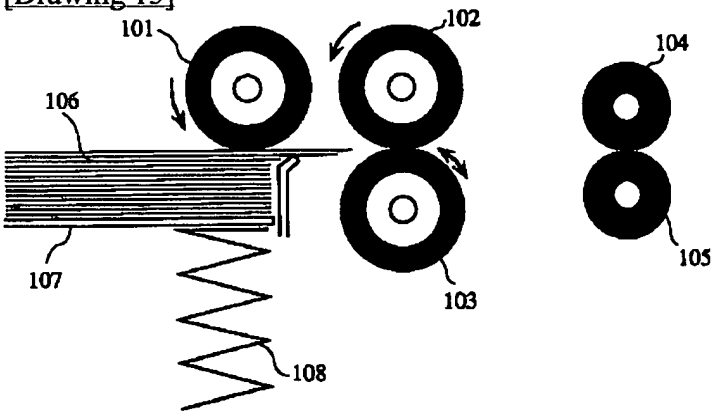


[Drawing 10]

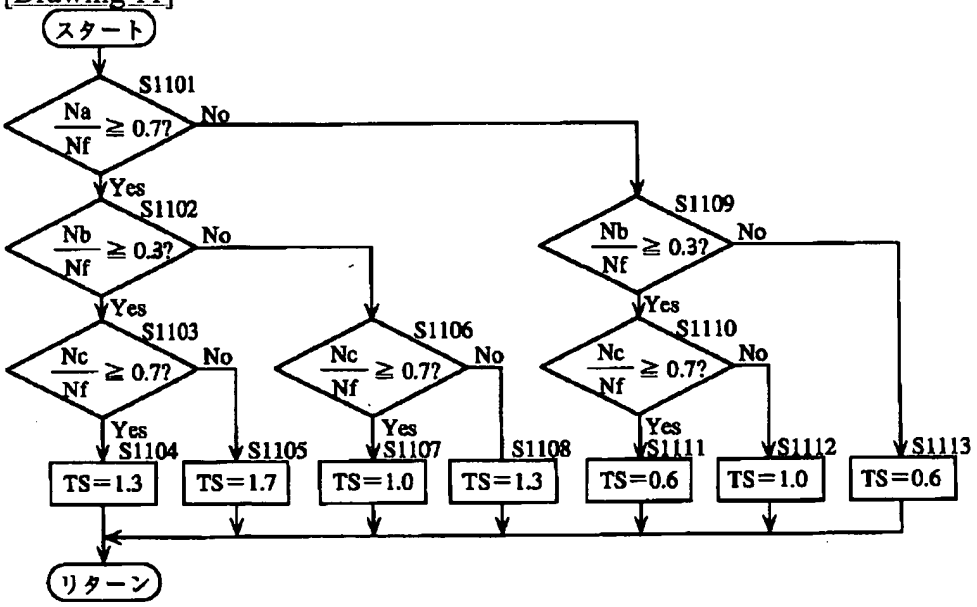
制御トルク値決定テーブル

$\frac{Na}{Nf} \geqq 0.7$	$\frac{Nb}{Nf} \geqq 0.3$	$\frac{Nc}{Nf} \geqq 0.7$	制御トルク値TS (比)
Yes	Yes	Yes	1.3
Yes	Yes	No	1.7
Yes	No	Yes	1.0
Yes	No	No	1.3
No	Yes	Yes	0.6
No	Yes	No	1.0
No	No	—	0.6

[Drawing 13]



[Drawing 11]



[Drawing 12]

	Sa(μ0の大小)	Sb(μ0のばらつき)	Sc(用紙給送力)
検知原理	ピックアップローラの受ける反力による	ピックアップローラでの連れ送り頻度による	用紙スリップ率による
用紙1枚ごとの計測法	ピックアップローラの位置移動をフォトスイッチで検出	さばき部直前の残留紙を反射型フォトセンサで検出	さばき後一定区間の通過時間tを反射型フォトセンサで計測
計数判別閾値	2値 μ0>0.7で計数 計数値=Na	2値 反射物有で計数 計数値=Nb	2値 t≧+30%で計数 計数値=Nc
情報単位TS値制御	情報単位枚数=N 初期給紙枚数=n0 現給紙枚数=n	❶ n ≦n0 ⇒TS=標準値 ❷ n0<n≦N⇒Nf=nとし,制御テーブルに従う ❸ N <n ⇒Nf=Nとし,制御テーブルに従う	
情報単位更新	計数量Nfにおける Na,Nb,Ncを順次スタックし書き替えていく		
情報単位判定基準	$\frac{Na}{Nf}$と0.7の比較	$\frac{Nb}{Nf}$と0.3の比較	$\frac{Nc}{Nf}$と0.7の比較
情報リセット	用紙積載装置の本体装置からの解除(用紙補給等)による		

[Translation done.]